

WHAT IS CLAIMED IS:

1. An excitation circuit for a switched reluctance drive, the excitation circuit comprising a plurality of switches for connecting a phase winding to a supply, the plurality of switches comprising a first set and a second set for supplying current to the phase winding and returning current to the supply, the switches of the first and second set being capable of conducting current in both a first and a second direction and the first set and second set being capable of handling different peak currents.
2. The excitation circuit according to claim 1 wherein the excitation circuit is arranged, during a motoring mode, to supply current to the phase winding via the first set and to provide a path for returning current to the supply via the second set and, during a generating mode, to supply current to the phase winding via the second set and to return current to the supply via the first set.
3. An excitation circuit according to claim 1, the direction of the current in the phase winding in a motoring mode being opposite to the direction of the current in the phase winding in a generating mode.
4. An excitation circuit according to claim 1 wherein at least one of the switches is capable of operating as a diode.
5. An excitation circuit according to claim 4 wherein the at least one switch has an inherent integral reverse diode.

6. An excitation circuit according to claim 4 wherein the at least one switch comprises a MOSFET.
7. An excitation circuit according to claim 1 wherein the switches comprise enhancement layer MOSFET switches.
8. An excitation circuit according to claim 1 wherein four switches are provided and the first set comprises two switches which are rated to a higher rating than the remaining two switches forming the second set.
9. An excitation circuit according to claim 1 wherein the excitation circuit comprises a first switch connected between a first end of the phase winding and a first voltage rail, a second switch connected between the first end of the phase winding and a second voltage rail, a third switch connected between a second end of the phase winding and the first voltage rail, and a fourth switch connected between the second end of the phase winding and the second voltage rail, the first and fourth switches forming the first set.
10. An excitation circuit according to claim 9 wherein the second and third switches form the second set.
11. An excitation circuit according to claim 1 wherein each of the switches is a MOSFET.
12. A switched reluctance drive including a machine having a rotor defining a plurality of rotor poles, a stator defining a plurality of stator poles, and at least one phase winding for exciting two or more of the poles, the switched reluctance drive including an excitation circuit comprising a plurality of switches for connecting a phase winding to a supply, the plurality of

switches comprising a first set and a second set, the excitation circuit being arranged, during a motoring mode, to supply current to the phase winding via the first set and to provide a path for returning current to the supply via the second set and, during a generating mode, to supply current to the phase winding via the second set and to return current to the supply via the first set, the first set and second set being capable of handling different peak currents.

13. A switched reluctance drive according to claim 12, the direction of the current in the phase winding in a motoring mode being opposite to the direction of the current in the phase winding in a generating mode.

14. A method of controlling a switched reluctance drive including a machine having a rotor defining a plurality of rotor poles, a stator defining a plurality of stator poles, and at least one phase winding for exciting two or more of the poles, the switched reluctance drive including an excitation circuit comprising a plurality of switches for connecting a phase winding to a supply, the plurality of switches comprising a first set and a second set, the method comprising, during a motoring mode, supplying current to the phase winding via the first set and returning current to the supply via the second set and, during a generating mode, supplying current to the phase winding via the second set and returning current to the supply via the first set.

15. A switched reluctance drive including a machine having a rotor defining a plurality of rotor poles, a stator defining a plurality of stator poles, at least one phase winding for exciting two or more of the poles, and an excitation circuit, the excitation circuit comprising a plurality of switches for connecting a phase winding to a supply, means for supplying current during a motoring mode to the phase winding via a first set of the switches and returning current to the

supply via a second set of the switches, and means for supplying current during a generating mode to the phase winding via the second set and returning current to the supply via the first set.